

NOTES ON THE LIFE HISTORY AND HABITS OF
PERIGASTER CRETURA (HERBST) (COLEOPTERA:
CURCULIONIDAE) WITH DESCRIPTIONS OF
THE LARVA AND PUPA¹

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ABSTRACT

Adults, larvae, and pupae of *Perigaster cretura* (Herbst) occur on species of *Ludwigia* and *Jussiaea* (Onagraceae). Larvae feed externally on the leaves and cover themselves with a protective covering of their own excrement. Pupation occurs on the leaves in a cell formed from a secreted material, excrement, and bits of debris. Larval and pupal stages are described and illustrated.

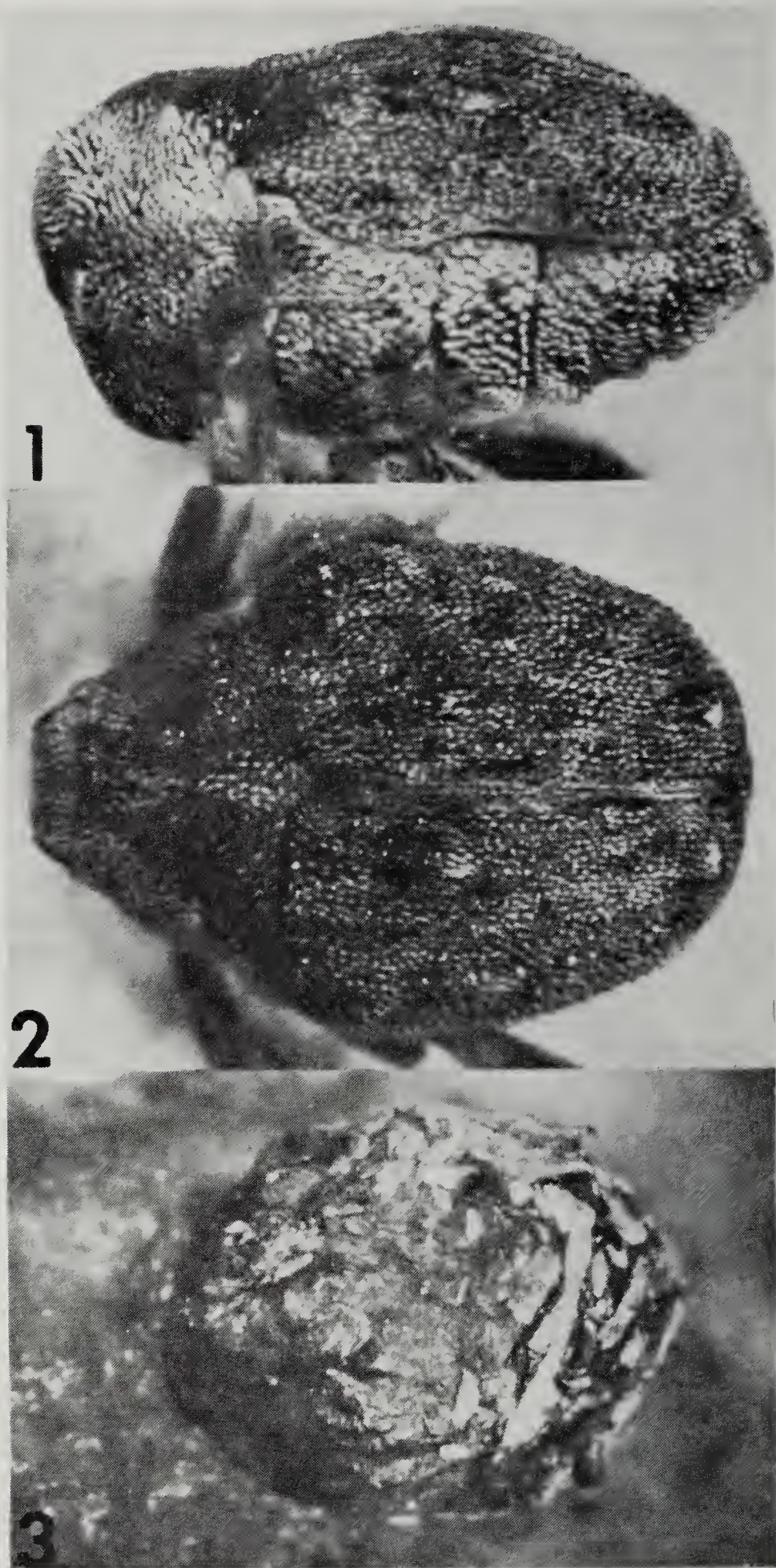
Several weevils in the subfamily Ceutorhynchinae have larvae which feed externally on the leaves of their host plant and cover themselves with a viscid secretion and their own excrement. These include members of the genera *Coelogaster* (Knab 1915), *Phytobius* (Hoffmann 1954, Scherf 1964) and *Perigaster cretura* (Herbst) (Mitchell and Pierce 1911, Knab 1915, and Pierce 1916). The purpose of this paper is to present observations on the life history and habits of *Perigaster cretura* and to describe the larval and pupal stages of the species.

LIFE HISTORY AND HABITS

Perigaster cretura (Figs. 1 and 2) is one of 5 species of this New World genus. The genus was revised by Buchanan (1931). Four species, including *P. cretura*, occur in the eastern United States; the 5th species is known only from Panama. Apparently nothing is known about the biology and host plants of the other 4 species of *Perigaster*. The 1st observations on the biology of *P. cretura* were by Mitchell and Pierce (1911), who stated that larvae feed externally on the foliage of *Ludwigia natans* (probably *L. nutans* Ell., Onagraceae) in South Texas. They reported that the larvae exude a sticky substance which apparently aids them in holding onto the leaf. They referred to a "dark shell" which "grows" over the back of the larva, which eventually covers it, and in which pupation occurs. Pierce (1916) amplified these notes, stating that the larvae are yellow in color and "have a gliding motion". He reported that they cover themselves with silk while they feed and that they are usually found under water. He also stated that the pupal cell is composed of silk and a dark substance and is impervious to water. Blatchley and Leng (1916), citing Pierce, repeated this information.

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Figs. 1-3: 1-2) Dorsal and lateral aspects of adult male *Perigaster cretura* (Herbst), collected at College Station, Brazos County, Texas, 20-V-1972, by W. E. Clark, on *Jussiaea repens* L. (length: 2.91 mm); 3) Pupal cell of *P. cretura* on leaf of the same plant (length: 3.32 mm).

Knab (1915) had also made observations on this species in Maryland. The species which he observed was identified as *Perigaster obscurus* (LeConte) by Pierce but was subsequently determined to be *P. cretura* (Buchanan 1931). Knab also reported that the larvae feed externally on the leaves of their host plant, in this case *Ludwigia alternifolia* L. He stated that the larvae occurred mainly on the undersides of the leaves and by their feeding made elongate holes in the center portions or cut pieces out of the sides of the leaves. Knab also reported that the larvae cover themselves with excrement imbedded in an anal secretion. He stated that this covering of excrement is transported anteriorly from the anus by "peristaltic movements of the body segments which are particularly violent posteriorly." When the larva is about to pupate, according to Knab, it sheds its covering and shapes it into a cocoon. Knab never actually found pupae in nature, however, and speculated that pupation normally occurs in the ground.

My observations on *Perigaster cretura* on *Jussiaea repens* L. (Onagraceae) were made around the edges of a small pond about 1 mile south of College Station, Brazos County, Texas between 13 May and 22 July, 1972. During the day adult weevils were observed on the upper surfaces of the leaves. They are, as Pierce (1916) observed, saltatorial and take flight at the slightest disturbance. They stridulate when handled. Adults were frequently seen in copula throughout this period, but oviposition and eggs were not observed.

Larvae feed externally on the leaves. Contrary to Knab's report, larvae were most frequently observed on the upper surfaces of the leaves. And contrary to Pierce's report, they were not seen under water even though lower leaves of the plants on which they were feeding were submerged most of the time. Frequently several larvae in different instars were feeding on a single leaf. Larvae confine their feeding activities for the most part to the leaves on the upper portions of the plant. Larvae were usually covered by excrement but on one occasion, when a heavy dew was present on the leaves, larvae were without their protective covering. These larvae were lying motionless in the depression along the midrib of the leaves.

Measurement of larval head capsules indicated that there are 3 larval instars.

Pupal cells (Fig. 3) were also observed on the upper surface of the leaves. Larvae apparently pupate on the leaf on which they had just been feeding. Leaves bearing pupal cells were usually riddled with holes made by feeding larvae. Pupal cells were noted as early as 20 May. On this date all of the cells examined contained mature larvae. Larvae, pupae, and adults were found in cells on leaves on 20 June. Larvae and adults were abundant on the plants on 22 July but no pupae were found on that date. Larvae present at that time were probably part of a 2nd generation.

Weevils were also observed under laboratory conditions. Leaves of the host plant on which larvae were feeding or on which pupal cells had been constructed were placed in petri dishes with a small amount of water. Larvae usually lost their covering of excrement in transport from the field to the laboratory but soon afterwards they began to restore it. From time to time as the larvae fed they flexed the posterior portion of the abdomen anteriorly in a rapid motion and defecated directly onto their backs. The movements of the larva caused the excrement to spread out over the body until it was completely covered.

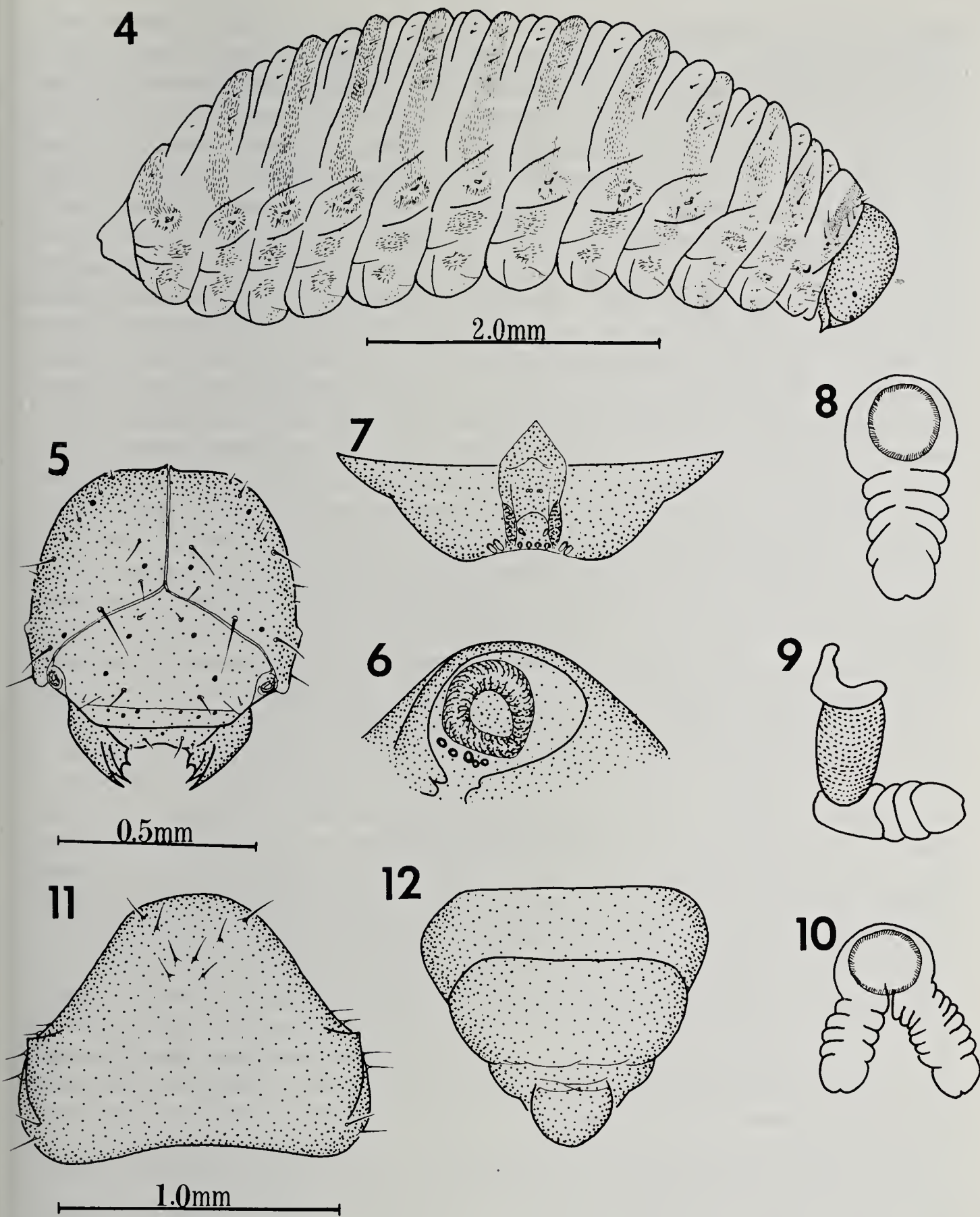
The pupal cell of *Perigaster cretura* (Fig. 3) consists of a thin layer of hard transparent material over which fecal material, bits of plant material, and other debris are added. In addition to the fecal and plant material, some pupal cases had bits of sand, small seeds, and in one instance the cast skin of a cicadellid (Homoptera) nymph incorporated into the matrix. Apparently the larva uses any material it encounters on the leaf for construction of the pupal cell. The small bits of plant material are probably parts of the leaf itself. There was no evidence that the larvae ever leave the leaf to gather material for construction of the cell. In many cells the layer of fecal material and debris did not completely cover the exposed transparent layer.

The hard transparent layer appears to be formed, in part at least, from the viscid material which always covers the larva. There is no silk incorporated in the construction of the cell, despite Pierce's (1916) report. One pupal cell brought into the laboratory contained a mature larva. This larva soon exited from the cell by chewing a hole through the wall. Soon afterward it constructed a new cell by chewing off pieces of the old cell and depositing the material directly onto its back. The movements of the larva caused this material to move posteriorly and eventually through accumulation the larva was entirely covered.

The pupal stage lasted about 1 week in the laboratory. The adult weevil emerges through a hole which it chews in the upper portion of the cell.

DESCRIPTION OF THIRD INSTAR LARVA

The terminology of setae and other structures follows Anderson (1947). *Body*: (Fig. 4) robust, feebly curved, thorax strongly narrowed anteriorly, becoming much narrower than abdomen; length, 4.2-6.0 mm (9 larvae); shining, pale yellow, with dense, fine seta-like asperities on pronotum, postdorsum, and spiracular, epipleural, and pleural areas; asperities often longer than short setae; pedal and eusternal areas with very small, acute asperities. *Head*: (Fig. 5) width, 0.61-0.68 mm, (18 larvae) subequal to length; free, uniformly light yellowish brown, rounded posteriorly. Anterior and posterior ocelli present; anterior ocellus usually with subcutaneous pigment. Antenna (Fig. 6) with accessory appendage modified to form a large ring with a median crater; with 5 smaller posterolateral rings. Catapophyses prominent. Frontal suture narrow, distinguishable throughout its entire length, incomplete anteriorly; endocarina absent. Frons with 3 pairs of setae; frontal seta 1 short, setae 2 and 3 absent, seta 4 long, seta 5 minute; 2 pairs of frontal sensilla present, 1 pair anterior to frontal seta 1, the other lateral and posterior to seta 4. Dorsal epicranium with 5 pairs of setae; setae 1, 2, 4 and 5 long, seta 3 short. One pair of sensilla located between dorsal epicranial setae 4 and 5; another pair of sensilla located between setae 1 and 3. Lateral epicranial seta 1 minute, lateral epicranial seta 2 long. Ventral epicranium with 2 short setae. Clypeus much wider than long, with 2 pairs of minute setae and 1 median sensillum. Labrum with 2 pairs of setae; labral seta 1 large, stout, labral seta 2 minute, labral seta 3 absent; medium labral sensillum present, lateral sensilla absent. Anterior margin of labrum broadly emarginate. Epipharynx (Fig. 7) with 4 large, blunt anterolateral setae, 4 very short indistinct anteromedian setae with large distinct setal bases, and 2 short, stout median



Figs. 4-12, Larva and pupa of *Perigaster cretura*: 4) larva, lateral view; 5) head capsule of larva, dorsal view; 6) antenna of larva; 7) epipharynx of larva; 8) larval thoracic spiracle, lateral view; 9) larval thoracic spiracle, dorsal view; 10) larval eighth abdominal spiracle, lateral view; 11) pronotum of pupa, dorsal view; 12) abdomen of pupa, ventral view.

spines; with 2 clusters of epipharyngeal sensory pores with 2 pores each. Labral rods short, stout, widely separated. Mandible short, stout, with 2 long and 1 short apical teeth; larger teeth with blunt serrations on inner margins; with 2 minute lateral setae and 1 sensillum. Maxillary palpus with 2 articles: basal article with 1 short lateral seta and 2 sensilla; apical article without setae, with 1 sensillum and apical cluster of minute papillae; stipes with 4 setae on ventral surface, setae 1, 3, and 4 long, seta 2 minute; mala with 4 dorsal and 5 ventral setae, 2 of the ventral setae short and blunt, closely set adjacent to each other, remaining 3 ventral setae long, acuminate; dorsal setae all long, acuminate. Labial palpus, single article with 2 sensilla and an apical cluster of papillae. Premental scerite incomplete, lacking posteromedian extensions; with 1 pair of long premental setae (1 member of a second pair sometimes present) and 1 pair of sensilla; glossa with 4 minute median setae and 2 sensilla. Postmental seta 1 short, located just posterior to postmental seta 2; postmental seta 2 long, seta 3 short. *Thorax*: pronotum with elongate dorsal median sclerotized plate; with 10 or 11 long setae (setae described on one side of body only). Thoracic spiracle (Figs. 8 and 9) unicameral, with 4 or 5 annuli and with an elongate, densely, minutely rugose tube arising from peritreme. Prodorsum of mesothorax and metathorax with 2 short setae. Postdorsum of mesothorax and metathorax with 4 setae; setae 1 and 3 long, setae 2 and 4 minute. Alar area with 1 minute seta. Spiracular area of mesothorax and metathorax with 1 minute seta. Epipleurum of mesothorax and metathorax with 2 moderately long setae. Pleural area of prothorax with 2 long setae and with 3 minute setae located along the extreme anterior edge; pleural area of mesothorax and metathorax with 1 long and 1 short seta. Pedal area of each segment with 2 short setae. Sternal seta minute or absent. *Abdomen*: spiracles on segments 1-7 unicameral, spiracle on segment 8 bicameral (Fig. 10); spiracles with long tube arising from peritreme as in thoracic spiracle. Typical abdominal segments each with 3 dorsal folds; fold III shorter than folds II and IV. Typical abdominal segments each with 1 minute and 1 moderately long prodorsal setae and with 2 long and 2 minute postdorsal setae; postdorsal setae 1 and 3 long, setae 2 and 4 minute, shorter than seta-like asperities on postdorsum. Spiracular seta 1 absent, seta 2 minute. Epipleurum with 1 long seta and 1 minute seta. Pleurum and pedal areas each with 1 minute seta; eusternum with 2 minute setae. Sternellum present. Anus terminal.

Material Examined: 23 third-instar larvae (5 slide mounted and 18 whole specimens), College Station, Brazos County, Texas, 13 and 20 May, 1972, from leaves of *Jussiaea repens*, Wayne E. Clark, collector. Determined by association with reared adults.

DESCRIPTION OF PUPA

Terminology follows system developed by Burke (1968) for pupae of the weevil tribe Anthonomini insofar as applicable. *Color*: whitish. *Rostrum*: 1 pair of distirostral setae located at about middle of rostrum; each seta borne on summit of very small tubercle; length of seta much less than $\frac{1}{2}$ width of rostrum. One pair of basirostral setae located on lower anteromedian margin of eye; each seta borne on summit of short rounded tubercle; setae about the same length as distirostrals but separated from

each other by distance much greater than distance separating distirostrals. Frontal setae each borne on summit of short round tubercle; tubercles separated by distance distinctly greater than length of a frontal seta. Superorbital setae borne on slightly smaller tubercles located adjacent to dorsal margin of eye. *Pronotum*: (Fig. 11) pronotal setae finely attenuate, slightly curved, each borne on summit of low round tubercle. Four pairs of anterolateral setae arranged in straight line extending diagonally from anterolateral margin of dorsum towards posterior ventrolateral portion of pleuron. Anteromedian setae widely separated. Discal setae located just posterior to anteromedian setae, slightly closer together than anteromedians. Two pairs of posteromedian setae located immediately posterior to discal setae; anterior most pair of posteromedians separated by distance slightly less than length of a setae; posterior pair of posteromedians more widely separated. Two pairs of posterolateral setae located just lateral and posterior to large posterolateral tubercle of pronotum. *Mesonotum and Metanotum*: devoid of setae. *Abdomen*: terga each with 1 pair of discotergal setae and 1 pair of laterotergal setae; setae minute, straight, each seta borne on summit of very small round tubercle. Segment 9 (Fig. 12) bluntly rounded at apex, devoid of setae or processes. Abdominal sterna devoid of setae. *Legs*: each femur bearing a pair of short fine setae on outer face near apex.

Material Examined: 1 pupa, reared from larva collected at College Station, Brazos County, Texas, 20 May, 1972, on foliage *Jussiaea repens*, W. E. Clark, collector. Determined by association with reared adults.

LITERATURE CITED

- ANDERSON, W. H. 1947. A terminology for the anatomical characters useful in the taxonomy of weevil larvae. *Proc. Ent. Soc. Wash.* 49:123-132.
- BLATCHLEY, W. S. AND C. W. LENG. 1916. *Rhynchophora* or weevils of north-eastern America. Nature Publ. Co., Indianapolis. 182 p.
- BUCHANAN, L. L. 1931. Synopsis of *Perigaster* (Coleoptera: Curculionidae). *J. Wash. Acad. Sci.* 21:320-325.
- BURKE, H. R. 1968. Pupae of the weevil tribe Anthonomini (Coleoptera: Curculionidae). *Tex. Agr. Exp. Sta., Tech. Monogr.* 5. 92 p.
- HOFFMAN, A. 1954. Coléoptères Curculionides (part 2). *Faune de France*, Lechevalier, Paris, 59:487-1208.
- KNAB, F. 1915. Dung-bearing weevil larvae. *Proc. Ent. Soc. Wash.* 17:193-194.
- MITCHELL, J. D. AND W. D. PIERCE. 1911. The weevils of Victoria County, Texas. *Proc. Ent. Soc. Wash.* 13:45-62.
- PIERCE, W. D. 1916. Notes on the habits of weevils (Coleoptera: Rhynchophora). *Proc. Ent. Soc. Wash.* 18:7-10.
- SCHERF, H. 1964. Die Entwicklungsstadien der mitteleuropaischen Curculioniden (Morphologie, Bionomie, Ökology). *Abh. Senckenb. Naturf. Ges.* 506:1-335.